

REMARKS

Claims 1 through 13 are currently pending in the application. Applicant has not amended the currently pending claims.

This amendment is in response to the Office Action of December 12, 2002.

In the Office Action, claims 1 through 10 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia et al. (U.S. Patent 5,827,783) in view of Wolf et al. (ISBN 0-9616721-6-1) and Haller et al. (U.S. Patent 5,804,506).

Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia et al. (U.S. Patent No. 5,827,783), Wolf et al. (ISBN 0-9616721-6-1) and Haller et al. (U.S. Patent 5,804,506) as applied to claim 10 above, and further in view of Kawakubo (U.S. Patent 5,889,696).

Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia et al. (U.S. Patent 5,827,783), Wolf et al. (ISBN 0-9616721-6-1) and Haller et al. (U.S. Patent 5,804,506) as applied to claim 10 above, and further in view of De Boer et al. (U.S. Patent 5,930,106 and DERWENT copy, under "Novelty").

Applicants further submit that to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure.

Additionally, Applicants submit that the Supreme Court has established the standard of patentability to be applied in obviousness rejections in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). This standard has been summarized in MPEP ' 2141 into four factual inquiries including A(A) determining of the scope and contents of the prior art; (B) ascertaining the differences between the prior art and the claims in issue; (C) resolving the level of ordinary skill in the pertinent art; and (D) evaluating evidence of secondary considerations.@ It should

be noted that, when applying the required patentability standards of *Graham*, the basic considerations which apply to obviousness rejections based on 35 U.S.C. ' 103 should include the following principles of patent law: A(A) the claimed invention must be considered as a whole; (B) the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) reasonable expectation of success is the standard with which obviousness is determined.@ *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

Claims 1 through 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia et al (5,827,783) in view of Wolf et al (ISBN 0-9616721-6-1) and Haller et al (5,804,506). In rejecting these claims, Applicants submit that the rejection fails to adhere to the above standards as set forth by the Supreme Court. With respect to the present claims, Applicants respectfully submit that the basic premise regarding the applicability of Hsia, embodied in a comment on page 3 of the Office Action mailed on December 12, 2002, violates (B), (C) and (D) of at the end of the preceding paragraph and, accordingly, such cited prior art cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention.

The relevant portion of the action states that "Wolf and Haller only serve to teach the material selection of the first non-conductive oxide and the second non-conductive oxide in the primary reference (Hsia et al, 5,827,783). It is already clear from the primary reference that necessary and sufficient requirements for the two materials are (a) that they must be non-conductive oxides, (b) that they must have standard use as dielectric in capacitors and [(c)] that they must have substantially different etch rates."

Point (B) of *Hodosh v. Block Drug Co., Inc* and *Graham v. John Deere Co* makes it clear that "the references must be considered as a whole..." The disclosure of Hsia, when taken as a whole, cannot be modified by the simple substitution of differentially doped BPSG layers for the alternating thermal CVD- and plasma CVD-deposited oxide layers, to yield Applicants' claimed invention. As indicated in a prior response, the use of doped BPSG layers instead of oxide layers will, in all likelihood, negatively affect the ability of Hsia's etching process to have the

required differential etching effect. It is at least uncertain, if not improbable, that the importation of differentially-doped BPSG layers will give a corrugated capacitor surface when Hsia's prescribed etchants are used. Furthermore, Hsia also discloses that the etch selectivity of the oxide layers can also be controlled by the processing parameters used in the deposition process. For instance, the gap (or the electrode spacing), the reactant gas pressure and the plasma power level can influence the properties of the oxide film obtained and consequently, its etch selectivity@ (*Id.*, col. 6, lines 29-34). Such parameters are irrelevant to the etch sensitivity of differentially-doped BPSG layers. The above comment from the Office Action, by disregarding the foregoing components of Hsia, clearly demonstrates that Hsia is not being considered "as a whole" to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention.

The substance of point (C) is that "the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention." Hsia does not anywhere contemplate or allude to a differential etching rate caused by anything other than mode of oxide layer deposition in combination with suitable etchants. It is respectfully submitted that the rejection of the claimed invention on the cited prior art exercises impermissible hindsight when he selectively broadens the scope of Hsia's disclosure to assert that Hsia teaches or suggests only that the layer materials are: (a) that they must be non-conductive oxides, (b) that they must have standard use as dielectric in capacitors and [(c)] that they must have substantially different etch rates. Page 3 of Office Action. Other constraints or factors which are not compatible with the substitution of doped BPSG layers and demonstrate that Hsia teaches away from any substitution of materials as asserted in the Office Action, such as the inability of Hsia's etchants to work with doped BPSG, as well as the irrelevance of Hsia's processing variables (preceding paragraph) to the characteristics of deposited BPSG, are conveniently disregarded clearly illustrating an impermissible hindsight reconstruction of Applicants' claimed invention under 35 U.S.C. § 103.

In addition, point (D) of *Hodosh v. Block Drug Co., Inc* and *Graham v. John Deere Co* is not adhered to in the rejection based upon the cited prior art for reasons given above thereby clearly demonstrating that a *prima facie* case of obviousness under 35 U.S.C. § 103 cannot be present based upon the cited prior art regarding the claimed invention: There is no reason to

believe that Hsia's etchants, which have an etching rate which corresponds to oxide density, will etch differentially-doped BPSG layers with different etch rates. Thus, there is no reasonable expectation of success in the way that the cited prior art has been combined to support a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention.

Standards, such as the one above, dictate the manner in which art must be considered when determining and establishing a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention. The following applicable standard focuses upon the characteristics of the art itself. The basic requirements of a *prima facie* case of obviousness are summarized in MPEP '2143 through '2143.03, *i.e.*, in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success in combining the references. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the expectation of success must both be found in the prior art, and not based on Applicants' disclosure. @ *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Further, in establishing a *prima facie* case of obviousness the initial burden is placed on the examiner. To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. @ *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). See also MPEP '706.02(j) and '2142.

In rejecting each of claims 1 through 10 and 13, obviousness has been concluded by combining only the relevant portions of the art, not the entire teaching or suggestion of the cited prior art: "Hsia et al do not necessarily teach the nonconductive layers 64 to be germanium borophospho silicate glass. However, the use of borophospho silicate glass is a standard choice for the dielectric in capacitors in the semiconductor device art as evidenced by Wolf et al because of ease of deposition at low temperatures, reduced stress, and relatively low glass flow

temperatures (pages 198-201), while it has been known for years that germanium doping of borophospho silicate glass markedly increases the etch rate (both wet and dry) of borophospho silicate glass, as witnessed by Haller (Abstract, fifth and sixth sentence; column 2, lines 65-67, and column 3, lines 17-24; cf. also Figs. 2 and 3)."

Applicant respectfully submits that all three criteria for a *prima facie* case of obviousness under 35 U.S.C. § 103 remain unmet by the arguments set forth in the Office Action. First, there is no motivation in Hsia, Wolf and Haller to combine the references and arrive at Applicants' claimed invention. Furthermore, there is no motivation in the knowledge available to one skilled in the art to do so. As discussed above, the substitution of doped BPSG for oxide would, in all likelihood, be foreseen to fail in yielding the desired corrugation when subsequently subjected to Hsia's etchants.

Additionally, for this reason, there can be little, if any, expectation of success in any such combination of the cited prior art.

The third criteria is also unmet in that the combination of the three cited prior art references do not and cannot teach or suggest every limitation of the claimed invention. Applicants respectfully submit that Wolf does not state or imply that BPSG be used in the same or similar manner in which BPSG is used by Applicants' claimed invention. Thus the teaching of Wolf cannot properly be combined with the teachings of Hsia and Haller to arrive at Applicant's device to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention. Wolf teaches or suggests that "BPSG films find wide use as the pre-metal dielectric layer between polysilicon and metal, and dielectrics between stacked capacitor and metal in DRAMs." Although BPSG is a dielectric, Applicants do not employ it in either of the above usages. In the first usage, Wolf clearly contemplates a dielectric layer located between polysilicon and metal, most likely as a dielectric between two capacitor plate layers. Figure 6 on page 200 shows a layer of BPSG directly under and contacting a metal layer. However, in Applicant's Figures 1 and 1a and in the claimed invention, the BPSG structure is analogous to a capacitor plate itself, and not the dielectric between two capacitor plate layers. Even if the words and figures of Wolf are taken in their most literal sense, Applicants' BPSG structure of Applicants' claimed invention is not between polysilicon and metal, in direct contact

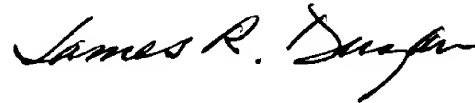
with metal, even allowing for the existence of intervening layers of other materials. In the second usage, Wolf contemplates a BPSG layer between a capacitor structure and metal. However, as can be seen from Applicant's Figure 1 and in the claimed invention, Applicants' BPSG structure is analogous to the capacitor structure itself. It is not between a capacitor structure and metal. Thus, Wolf, because it does not teach or suggest the use of BPSG as Applicants use it and set forth such structure in the claimed invention, cannot be properly combined with the teachings of Haller and Hsia to establish a prima facie case of obviousness under 35 U.S.C. § 103 regarding the claimed invention. Applicants submit that it is improper and impracticable to generalize, as set forth in part (b) of the Office Action comment above, that Wolf discloses that BPSG "have standard use as dielectrics in capacitors" when Applicants use the BPSG in a different manner than disclosed by Wolf because such a generalization does not and cannot establish a prima facie case of obviousness under 35 U.S.C. § 103 regarding the claimed invention.

Claims 11 and 12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Hsia, Wolf and Haller, and further in view of Kawakubo (5,889,696) and DeBoer et al (5,930,106 and DERWENT copy under "Novelty") respectively. Applicants respectfully submit that Claims 11 and 12 are allowable as depending from claim 10, itself allowable as set forth hereinabove.

In summary, Applicants submit that claims 1 through 13 are clearly allowable over the cited prior art.

Applicants request the allowance of claims 1 through 13 and the case passed for issue.

Respectfully submitted,



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Enclosure: Version with Markings to Show Changes Made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

A marked-up version of paragraph [0001], highlighting the changes thereto, follows:

[0001] This application is a divisional of application Serial No. 09/651,946, filed August 31, 2000, [pending] now U.S. Patent 6,346,455 B1, issued February 12, 2002.